9.17 Find $f_r$ for a MOSFET operating at $I_d = 100$ μA and $V_{OV} = 0.2$ V. The MOSFET has $C_p = 20$ fF and $C_{gd} = 5$ fF.

9.20 It is required to calculate the intrinsic gain $A_0$ and the unity-gain frequency $f_T$ of an $n$-channel transistor fabricated in a 0.18-μm CMOS process for which $L_{ov} = 0$, $L = 0.1$, $μ_n = 450$ cm$^2$/V·s, and $V'_d = 5$ V/μm. The device is operated at $V_{OV} = 0.2$ V. Find $A_0$ and $f_T$ for devices with $L = L_{min}$, $2L_{min}$, $3L_{min}$, $4L_{min}$, and $5L_{min}$. Present your results in a table.

9.29 In a particular common-source amplifier for which the midband voltage gain between gate and drain (i.e., $-g_m R'_L$) is $-29$ V/V, the NMOS transistor has $C_{gs} = 0.5$ pF and $C_{gd} = 0.1$ pF. What input capacitance would you expect? For what range of signal-source resistances can you expect the 3-dB frequency to exceed 10 MHz? Neglect the effect of $R_G$.

(see Fig. 9.2(a))

9.33 A discrete MOSFET common-source amplifier has $R_G = 1$ MΩ, $g_m = 5$ mA/V, $r_o = 100$ kΩ, $R_p = 10$ kΩ, $C_p = 2$ pF, and $C_{gd} = 0.4$ pF. The amplifier is fed from a voltage source with an internal resistance of 500 kΩ and is connected to a 10-kΩ load. Find:
(a) the overall midband gain $A_m$
(b) the upper 3-dB frequency $f_u$
(c) the lower 3-dB frequency $f_l$

(see Fig. 9.2(a))

9.35 The NMOS transistor in the discrete CS amplifier circuit of Fig. P9.3 is biased to have $g_m = 1$ mA/V and $r_o = 100$ kΩ. Find $A_m$. If $C_{gg} = 1$ pF and $C_{gs} = 0.2$ pF, find $f_u$.

9.44 An amplifier with a dc gain of 60 dB has a single-pole high-frequency response with a 3-dB frequency of 10 kHz.
(a) Give an expression for the gain function $A(s)$.
(b) Sketch Bode diagrams for the gain magnitude and phase.
(c) What is the gain–bandwidth product?
(d) What is the unity-gain frequency?

9.57 An ideal voltage amplifier with a voltage gain of $-1000$ V/V has a 0.2-pF capacitance connected between its output and input terminals. What is the input capacitance of the amplifier? If the amplifier is fed from a voltage source $V_{sig}$ having a resistance $R_{sig} = 1$ kΩ, find the transfer function $V_o/V_{sig}$ as a function of the complex-frequency variable $s$ and hence the 3-dB frequency $f_u$ and the unity-gain frequency $f_u$.
the midband gain, $A_M$
Use Millers Theorem and then find the estimated pole locations at the input and output nodes.

Fig. 9.19

Use OTC method for finding $f_H$

Use OTC method for finding $f_H$